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UNITED STATES PATENT AND TRADEMARK OFFICE

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BEFORE THE PATENT TRIAL AND APPEAL BOARD

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*Ex parte* FLINT O. THOMAS

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Appeal 2011-011128  
Application 11/686,153  
Technology Center 3600

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Before EDWARD A. BROWN, LYNNE H. BROWNE and  
MITCHELL G. WEATHERLY, *Administrative Patent Judges*.

BROWNE, *Administrative Patent Judge*.

DECISION ON APPEAL

## STATEMENT OF THE CASE

Flint O. Thomas (Appellant) appeals under 35 U.S.C. § 134 from the Examiner's decision rejecting claims 1, 3-8 and 29-51. Claims 2 and 9-28 are canceled. We have jurisdiction under 35 U.S.C. § 6(b).

We AFFIRM.

## CLAIMED SUBJECT MATTER

Claims 1, 29, 35 and 47 are independent; claim 1 is reproduced below:

1. A plasma fairing comprising:

at least one single dielectric barrier discharge plasma actuator coupled to an outer surface of an aircraft landing gear, the single dielectric barrier discharge plasma actuator having an exposed electrode and an enclosed electrode separated by a dielectric barrier material and adapted to generate a plasma along at least a portion of the outer surface of the aircraft landing gear; and

a power supply electrically coupled to the at least one single dielectric barrier discharge plasma actuator such that when the power supply energizes the at least one single dielectric barrier discharge plasma actuator, a velocity component in a downstream direction of the fluid flow is induced, thereby reducing body flow separation of a fluid flow over the aircraft landing gear,

wherein the power supply is to provide an unsteady actuation signal with time-scales to provide a particular excitation frequency to the plasma actuator comparable to a relevant frequency of a particular fluid flow control application that the plasma actuator is to control.

### PRIOR ART

Kremeyer	US 6,527,221 B1	Mar. 4, 2003
Malmuth	US 6,805,325 B1	Oct. 19, 2004
Enloe	US 7,380,756 B1	Jun. 3, 2008
Chow	US 7,484,688 B2	Feb. 3, 2009
Scott	US 2004/0200932 A1	Oct. 14, 2004
Kawamura	US 2005/0255255 A1	Nov. 17, 2005

### GROUND OF REJECTION

1. Claims 1, 3-5, 7, 8, 29-34 and 47-51 stand rejected under 35 U.S.C. § 103(a) as unpatentable over Scott, Chow and Malmuth.
2. Claims 6 and 46 stand rejected under 35 U.S.C. § 103(a) as unpatentable over Scott, Chow, Malmuth and Kremeyer.<sup>1</sup>
3. Claims 35-37, 40, 41 and 43-45 stand rejected under 35 U.S.C. § 103(a) as unpatentable over Scott, Chow and Kremeyer.
4. Claims 38 and 39 stand rejected under 35 U.S.C. § 103(a) as unpatentable over Scott, Chow, Kremeyer and Kawamura.
5. Claim 42 stands rejected under 35 U.S.C. § 103(a) as unpatentable over Scott, Chow, Kremeyer and Enloe.

### OPINION

*Claims 1, 3-8, 29-37, 40, 41 and 43-51*

The Examiner finds that Scott disclose every limitation of independent claims 1, 29 and 47 except for a “plasma actuator [that] is

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<sup>1</sup> Unlike the Examiner, we do not consider the order in which prior art is applied in a rejection to be significant. *See e.g., In re Bush* 296 F.2d 491, 496 (C.C.P.A. 1961).

coupled to an outer surface of an aircraft landing gear” (Ans. 5) and a “power supply [that] provide[s] an unsteady actuation signal with time-scales to provide a particular excitation frequency . . . .” (Ans. 6). *See* Ans. 4-8. The Examiner finds that Chow “teaches using a flow diverting device on an aircraft’s landing gear.” Ans. 5. The Examiner further finds that Malmuth “teaches providing time scale adjusted voltage to a plasma actuator to adapt to variations in flight conditions (differences in fluid flow).” Ans. 6-7. Based on these findings, the Examiner concludes that the combined teachings of Scott, Chow and Malmuth render claims 1, 29 and 47 unpatentable. Additionally, the Examiner finds that the combined teachings of Scott and Chow teach every limitation of claim 35 except for “using the plasma actuator for noise reduction.” Ans. 12. The Examiner finds that Kremeyer “teaches using a plasma generating device to reduce drag and noise from a body moving through a fluid such as an aircraft moving through air.” *Id.* Based on this additional finding, the Examiner concludes that the combined teachings of Scott, Chow and Kremeyer render claim 35 unpatentable.

Appellant contends that

None of Scott, Chow, Malmuth, or Kremeyer, either alone or in combination, describes or suggests a plasma actuator that adheres a fluid flow over a landing gear by inducing a velocity component in a downstream direction, or describes an excitation frequency comparable to a relevant frequency of a fluid flow to reduce noise causing vortices. Moreover, even if the cited art described all of the claimed features, there is no motivation to combine the references as suggested by the examiner. Accordingly, it follows that none of Scott, Chow, Malmuth, and Kremeyer either alone

or in combination, can render obvious claims 1, 29, 35, 47, or any claims dependent thereon.

Br. 7. In support of this contention, Appellant argues each of the references relied upon by the Examiner in the rejection of independent claims 1, 29 and 47. Appellant further argues the Kremeyer reference which the Examiner relies upon in the rejection of independent claim 35. We will address Appellant's argument in the same manner.

Appellant has not presented separate arguments for the patentability of any of the claims. We select claim 1 as illustrative of the group of claims 1, 3-5, 7, 8, 29-34 and 47-51 and the remaining claims of this group stand or fall with claim 1. *See* 37 C.F.R. § 41.37(c)(1)(vii) (2011). Claims 6, 36, 37, 40, 41 and 43-46 either depend from claim 35 or are rejected using Kremeyer in addition to Scott, Chow and Malmuth. We select claim 35 as representative of the group of claims 6, 35-37, 40, 41 and 43-46 and the remaining claims of this group stand or fall with claim 35. Claims 38, 39 and 42 are subject to different grounds of rejection and are addressed separately below.

Scott:

Appellant argues that "Scott fails to teach or suggest a plasma generating device having a first, exposed electrode and second electrode separated from the fluid flow by a dielectric, to generate plasma that induces a velocity component in a downstream direction of the fluid flow." Br. 7. The Examiner finds that Scott discloses "an exposed electrode (item 7 or 9 of Scott figure 2) and an enclosed electrode (item 16)." Ans. 5. The Examiner further finds that Scott's teaching of redirecting the flow at some angle away from the surface of an aerodynamically exposed aircraft component "inherently induces 'velocity components' in the flow both

upstream and downstream.” Ans. 6.

Appellant’s arguments are unconvincing. Appellant’s statement that Scott’s electrodes 7 and 9 “are both exposed to the fluid flow” (Br. 8) while correct is not indicative of error, as the Examiner relied upon Scott’s electrode 16, not electrode 9, to meet the claim limitation requiring a second enclosed electrode separated by a dielectric barrier material. Appellant’s argument, that Scott’s expanding air is “a dramatically different phenomena than is recited in the present claims” (Br. 8) is not responsive to the rejection as articulated by the Examiner because the Examiner did not rely upon the airflow created between electrodes 7 and 9 to meet the limitations requiring inducement of “a velocity component in a downstream direction of the fluid flow.” Br. 20, Clms. App’x. As discussed *supra*, the Examiner finds that this limitation is inherently met by Scott’s disclosure of redirecting the flow away from the surface of the aircraft. Appellant does not persuasively address this finding by the Examiner. Thus, Appellant has not apprised us of error in the Examiner’s findings.

Appellant further argues that “Scott fails to teach or suggest the actuation of a plasma generator at an excitation frequency comparable to a relevant frequency of a fluid flow to reduce noise causing vortices.” Br. 9. Appellant’s argument is not persuasive as actuation of a plasma generator at an excitation frequency comparable to a relevant frequency of a fluid flow *to reduce noise causing vortices* is not claimed in any of the claims.

Chow:

Appellant states that “Chow teaches the use of a flow diverting device on a landing gear having a completely different operating principle than the present claims.” Br. 9. Appellant notes that Chow’s device is “passive (no

external power required) and is simply a porous mechanical fairing which covers a portion of the gear and in so-doing deflects a portion of the air flow away from the gear elements.” *Id.* Based on these observations about Chow’s device Appellant argues that:

Chow fails to describe or suggest a plasma generating device having a first, exposed electrode and second, enclosed electrode separated from the fluid flow by a dielectric, to generate plasma that induces a velocity component in a downstream (i.e., parallel) direction of the fluid flow to reduce body flow separation of the fluid flow.

Br. 10.

Appellant’s argument is not responsive to the rejection as set forth by the Examiner as the rejection does not rely upon Chow to teach a plasma generating device having a first exposed electrode and a second exposed electrode separated by a dielectric. As discussed *supra*, the Examiner correctly finds that Scott describes a plasma generating device having these features as claimed. The rejection relies upon Chow to teach placement of Scott’s plasma generating device on the landing gear of an aircraft. Ans. 5. Appellant has not apprised us of error in the Examiner’s finding that Chow teaches using a flow diverting device on an aircraft’s landing gear. Accordingly, Appellant’s argument is not persuasive.

Appellant further argues that Chow “fails to teach or suggest the actuation of a plasma generator at an excitation frequency comparable to a relevant frequency of a fluid flow to reduce noise causing vortices.” Br. 10. As discussed *supra*, this argument is not persuasive as this feature is not claimed.



Malmuth:

Appellant states that Malmuth “describes a completely different operating principle than the present claims.” Br. 11. Appellant further states that “Malmuth is used for different purpose (not bluff body vortex cancelation).” *Id.* Based on these differences, Appellant argues that “Malmuth fails to describe an unsteady actuation signal to provide a particular excitation frequency comparable to the relevant frequency of the fluid flow as claimed.” *Id.* In support of this argument, Appellant argues that:

in the present claims, the power supply is energized and de[-]energized for “unsteady operation” which is used to cancel vortex shedding (see e.g., paras. 0056, 0057, et. seq.). In the present claims, it is the cycling of energization and de[-]energization that leads to an excitation frequency (see FIG. 6B) which in combination with the associated duty cycle is useful in bluff body flow control.

Br. 11-12.

In response to these arguments the Examiner finds that “Malmuth teaches a plasma generating device for drag reduction that includes a controlled voltage source that uses a time scale adaptable to changing flight conditions and is adjusted (by the controller) to provide plasma discharge consistent with the fluid flow state.” Ans. 20. The Examiner additionally finds that “Malmuth teaches that the fluid flow state is determined by the controller and the voltage is varied accordingly.” *Id.* The Examiner correctly determines that Appellant’s “claim language requires a power supply (voltage source) that is capable of providing an ‘unsteady actuation signal with time scales to provide a particular excitation frequency to the

plasma actuator comparable to a relevant frequency of a particular fluid flow control application that the plasma actuator is to control’.” Ans. 20-21. The Examiner further determines that “[t]he Malmuth device includes a voltage source that is capable of performing in the claimed manner” and that “Malmuth discloses providing a potentially unsteady actuation signal (voltage source) that is delivered on a ‘time-scale’ that allows for adapting to changing flight (and flow) conditions.” Ans. 21 (citing, Malmuth, col. 5, ll. 59-67). The Examiner further notes that “the claimed ‘excitation frequency’ is merely the output frequency of the voltage source that excites the plasma actuators (electrodes) and Malmuth teaches providing a varying output frequency (of the voltage source) to excite the plasma actuators (to produce plasma) depending on the fluid flow state.” *Id.* Additionally, the Examiner notes that “[i]n reference to the claimed use of ‘timescale’ in regards to the ‘actuation signal’, both Appellant’s specification (par. 42 and 43) and the Malmuth teaching (col. 5, lines 59-67) refer to providing a voltage source on a time-scale relevant to a particular fluid flow.” *Id.*

We agree with the Examiner’s claim construction as detailed *supra* and further note that Appellant is arguing features (*e.g.*, de-energization) that are not claimed. *See* Br. 11. Although the claims are interpreted in light of the specification, limitations from the specification are not read into the claims. *In re Van Geuns*, 988 F.2d 1181, 1184 (Fed. Cir. 1993).

Appellant further argues that Malmuth “fails to teach or suggest the actuation of a plasma generator at an excitation frequency comparable to a relevant frequency of a fluid flow to reduce noise causing vortices.” Br. 12. As discussed *supra*, this argument is not persuasive as this feature is not claimed.

Kremeyer:

Appellant argues that Kremeyer fails to disclose “a plasma generating device having a first, exposed electrode and second, enclosed electrode separated from the fluid flow by a dielectric, to generate plasma that induces a velocity component in a downstream (i.e., parallel) direction of the fluid flow to reduce body flow separation of the fluid flow.” Br. 13.

Appellants’ argument is not responsive to the rejection as articulated by the Examiner as the rejection relies upon Scott, not Kremeyer, for these features as discussed *supra*. Accordingly, Appellant has not apprised us of error.

Motivation to Combine Any of the Cited References:

Appellant contends that “there simply is no motivation for a person of ordinary skill in the art of passive landing gear fairings to combine any of the current references.” Br. 13. This argument is foreclosed by *KSR Int’l Co. v. Teleflex Inc.*, 550 U.S. 398 (2007), in which the Court rejected the rigid requirement of a teaching or suggestion or motivation to combine known elements in order to show obviousness. *KSR*, 550 U.S. at 415. The Court noted that an obviousness analysis “need not seek out precise teachings directed to the specific subject matter of the challenged claim, for a court can take account of the inferences and creative steps that a person of ordinary skill in the art would employ.” *Id.* at 418.

To the extent that Appellant is arguing that the Examiner has failed to provide reasons with rational underpinning for combining the references, Appellant’s arguments are not convincing. The Federal Circuit has stated that “rejections on obviousness grounds cannot be sustained by mere conclusory statements; instead, there must be some articulated reasoning

with some rational underpinning to support the legal conclusion of obviousness.” *In re Kahn*, 441 F.3d 977, 988 (Fed. Cir. 2006), cited with approval in *KSR*, 550 U.S. at 418. In this case, the Examiner has articulated reasoning with rational underpinning for combining the teachings of the applied references relied upon to reject the claims. *See* Ans. 5-18.

Appellant has not apprised us of error in either the Examiner’s findings or the conclusions the Examiner has drawn from those findings. Accordingly, Appellant’s argument is not convincing.

Appellant’s argument that the Examiner is taking Official Notice (Br. 17), is not taken well as the Examiner has not indicated that Official Notice has been taken.

For these reasons, we sustain the Examiner’s rejection of claims 1, 3-8, 29-37, 40, 41, and 43-51.

*Claims 38 and 39*

Appellant does not present separate arguments for the patentability of claims 38 and 39. *Br. passim*. Accordingly, we sustain the Examiner’s rejection of claims 38 and 39.

*Claim 42*

Appellant does not present separate arguments for the patentability of claim 42. *Br. passim*. Accordingly, we sustain the Examiner’s rejection claim 42.

Appeal 2011-011128  
Application 11/686,153

DECISION

The Examiner's rejections of claims 1, 3-8 and 29-51 are  
AFFIRMED.

No time period for taking any subsequent action in connection with  
this appeal may be extended under 37 C.F.R. §1.136(a).

AFFIRMED

rvb